Multi-Use Passive RFID Sensor Tag System for NASA, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

This proposal will provide NASA with a family of UHF RFID sensor tags and system components supporting very reliable, robust, convenient and economical deployment into a range of aerospace and terrestrial systems. We propose designs that can be manufactured in quantity. Several of these tags have SPI,I2C and other data busses and adequate harvested power to enable on-tag microcontroller and multiple discrete sensors. The Phase1 deliverable systems include passive and semi-passive tags both with an application example precision temperature sensor and 3-D accelerometer. The RFID sensor tags have as standard SPI, I2C, UART and other busses together with a rad-hard supported on an on-tag MSP430FR5739 microcontroller. The data busses on delivered sensor tags can be used to interface with any bus-compatible sensors of NASA choice. The technology we propose in Phase1/2 work provides NASA with features considerably beyond present day commercial offerings. The antennas for Phase1 sensor tag delivery utilize our ultra-long range ribbon antenna design which currently holds the world record for maximum UHF fully passive read-range (150ft). In Phase1 we introduce our patents-pending resonant rectenna which provides additional passive power for sensors in addition to our basic ultra-long range antenna.The UHF transponders ICs selected for NASA from NXP and EM have the best RFID tag security algorithms currently available. In Phase1 we introduce our patents-pending rectenna which provides additional passive power for sensors continuing to use our basic ultra-long range antenna (rectenna uses an innovative resonant voltage multiplier circuit). It is our vision that New Jersey Microsystems, Inc and its partners following Phase3 work can earn selection from NASA as a preferred supplier of customized UHF RFID passive and semi-passive sensor tags. During Phase1 we will deliver tags with demo sensors for precision temperature and 3-D inertial application.

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Small Business Innovation Research/Small Business Tech Transfer

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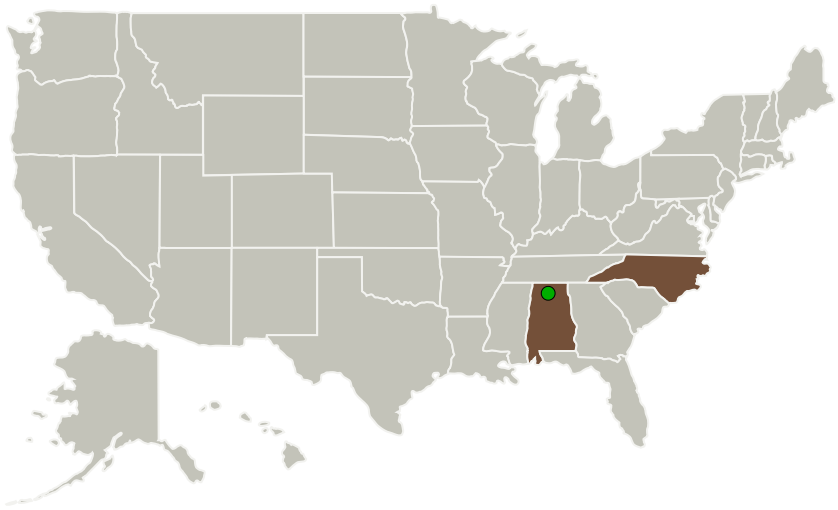
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
New Jersey Microsystems, Inc	Lead Organization	Industry	NEWARK, New Jersey
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	North Carolina

Project Transitions

June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139678)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

New Jersey Microsystems, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

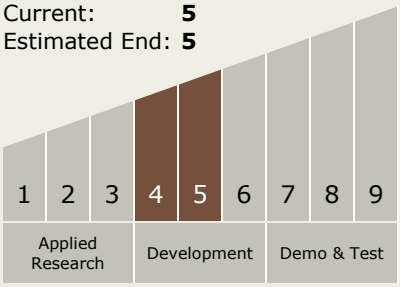
Carlos Torrez

Principal Investigator:

William N Carr

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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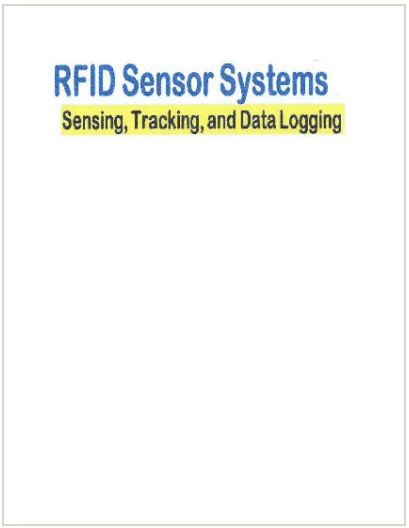
Images



Briefing Chart Image
Multi-use Passive RFID Sensor Tag System for NASA, Phase I
(https://techport.nasa.gov/image/131624)

Final Summary Chart Image
Multi-use Passive RFID Sensor Tag System for NASA, Phase I Project Image
(https://techport.nasa.gov/image/130538)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System